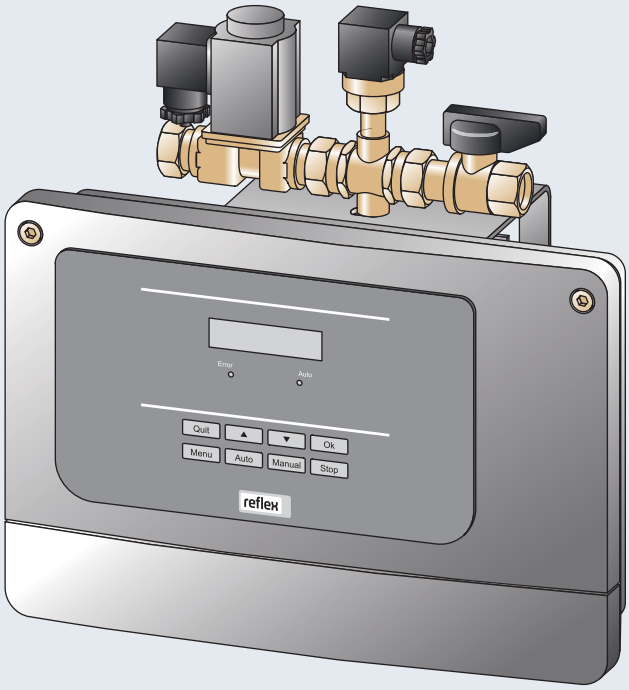
reflex
Thinking solutions.

Fillcontrol Plus

GB Operating manual

Original operating manual



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1 Notes on the operating manual

This operating manual is an important aid for ensuring the safe and reliable functioning of the device.

The operating manual will help you to:

- avoid any risks to personnel.
- become acquainted with the device.
- achieve optimal functioning.
- identify and rectify faults in good time.
- avoid any faults due to improper operation.
- cut down on repair costs and reduce the number of downtimes.
- improve the reliability and increase the service life of the device.
- avoid causing harm to the environment.

Reflex Winkelmann GmbH accepts no liability for any damage resulting from failure to observe the information in this operating manual. In addition to the requirements set out in this operating manual, national statutory regulations and provisions in the country of installation must also be complied with (concerning accident prevention, environment protection, safe and professional work practices, etc.).

This operating manual describes the device with basic equipment and interfaces for optional equipment with additional functions. For optional equipment and accessories, see chapter 4.6 "Optional equipment and accessories" on page 12 ..

Notice!

Every person installing this equipment or performing any other work at the equipment is required to carefully read this operating manual prior to commencing work and to comply with its instructions. The manual is to be provided to the device operator and must be stored near the device for access at any time.

2 Liability and guarantee

The device has been designed using state-of-the-art technology and in accordance with generally recognised technical safety regulations. Nevertheless, its use can pose a risk to life and limb of personnel or third persons as well as cause damage to the system or other property.

It is not permitted to make any modifications at the device, such as to the hydraulic system or the circuitry.

Warranty and liability claims will not be accepted by the manufacturer if these can be traced back to one or more of the following causes:

- Improper use of the device.
- Improper start-up, operation, maintenance, servicing, repair or installation of the device.
- Failure to observe the safety information in this operating manual.
- Operation of the device with defective or improperly installed safety/protective equipment.
- Failure to perform maintenance and inspection work according to schedule.
- Use of unapproved spare parts and accessories.

The proper installation and start-up of the device is a prerequisite for the making of warranty claims.

Note!

Have the Reflex Customer Service carry out commissioning and the annual maintenance, see chapter 12.1 "Reflex Customer Service" on page 42 .

3 Safety

3.1 Explanation of symbols

3.1.1 Symbols and notes used

The following symbols are used in this operating manual.

Danger

- Danger to life and/or severe damage to health
  - The corresponding warning symbol in combination with the "Danger" signal term indicates an imminent threatening danger which will result in death or severe (irreversible) injuries.

Warning

- Severe damage to health
  - The corresponding warning symbol in combination with the "Warning" signal term indicates a threatening danger which may result in death or severe (irreversible) injuries.

Caution

- Damage to health
  - The corresponding warning symbol in combination with the "Caution" signal term indicates a danger which may result in minor (reversible) injuries.

Attention!

- Damage to property
  - This symbol in combination with the "Attention" signal word indicates a situation that may cause damage to the product itself or objects in its vicinity.

Notice!

This symbol in combination with the "Notice" signal word indicates useful tips and recommendations regarding the efficient use of the product.

3.1.2 Safety symbols used

The following safety symbols are used in this operating manual. They are also attached to the equipment or in its vicinity.

This symbol warns of electric.voltage.

This symbol warns of a hot surface.

This symbol warns of overpressure in conduits and connections.

3.2 Personnel requirements

Only specialist personnel or specifically trained personnel may install and operate the equipment.

The electric connections and the wiring of the device must be executed by a specialist in accordance with all applicable national and local regulations.

3.3 Personal protective equipment

When working at the system, wear the stipulated personal equipment such as hearing and eye protection, safety boots, helmet, protective clothing, protective gloves.

See the national regulation of your country for personal protective equipment required.

3.4 Intended use

The device is a pressure maintaining station for heating and cooling water systems. It is intended to maintain the water pressure and to add water within a facility system. The devices may be used only in systems that are sealed against corrosion and with the following water types:

- Non-corrosive
- Chemically non-aggressive
- Non-toxic

The ingress of atmospheric oxygen by permeation into the entire heating and cooling water system, make-up water and similar must be reliably minimised during operation.

3.5 Inadmissible operating conditions

The devices are not suited for the following conditions.

- In mobile system operation.
- For outdoors operation.
- For the use with mineral oils.
- For the use with flammable media.
- For the use with distilled water.

Notice!

Changes to the hydraulic system or interference with the interconnection are strictly prohibited.

3.6 Residual risks

This device has been manufactured to the current state of the art. However, some residual risk cannot be excluded.

Warning – large weight!

- The devices are very heavy. Thus, there is a risk of physical damage and accidents.
  - Use only lifting gear suitable for transport and installation.

Caution – risk of burning!

- Excessively hot surfaces in heating systems can cause burns on the skin.
  - Wear protective gloves.
  - Please place appropriate warning signs in the vicinity of the device.

Caution – risk of injury!

- If installation, removal or maintenance work is not carried out correctly, there is a risk of burns and other injuries at the connection points, if pressurised hot water or hot steam suddenly escapes.
  - Ensure proper installation, removal or maintenance work.
  - Ensure that the system is de-pressurised before performing installation, removal or maintenance work at the connection points.

4 Description of the device

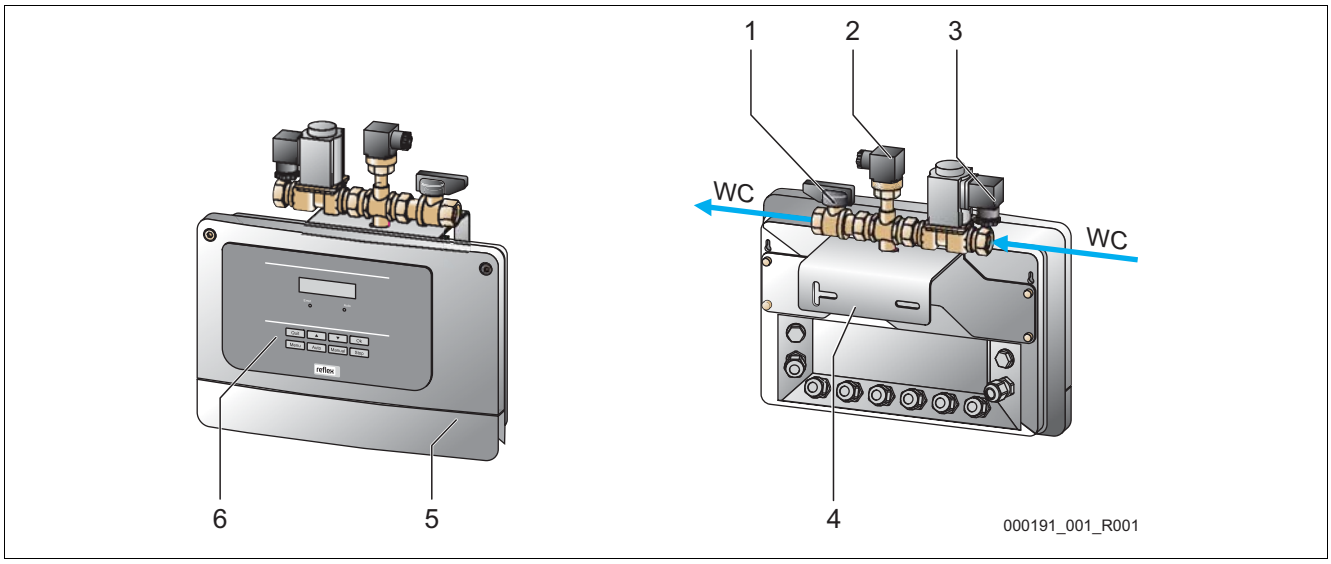
4.1 Description

The device is a make-up station for heating and cooling water systems without pump. The device controller regulates the make-up with water for the facility system.

The device is designed for two make-up systems:

- Adding fresh water to facility systems with a diaphragm expansion tank.
- Adding fresh water to facility systems with pressure maintaining station.

4.2 Overview



1	"BV" shut-off valve
2	"PIS" pressure transducer
3	"WV" make-up valve
4	Console for wall mounting

5	Cover (hinged)
6	Control Basic controller
WC	Fresh water inlet/outlet

4.3 Identification

4.3.1 Nameplate

The nameplate provides information about the manufacturer, the year of manufacture, the manufacturing number and the technical data.

Information on nameplate	Meaning
Type	Device name
Serial No.	Serial number
min. / max. allowable pressure P	Minimum/maximum permissible pressure
max. continuous operating temperature	Maximum temperature for continuous operation
min. / max. allowable temperature / flow temperature TS	Minimum/maximum permissible temperature/TS flow temperature
Year built	Year of manufacture
min. operating pressure set up on shop floor	Factory-set minimum operating pressure
at site	Set minimum operating pressure
max. pressure saftey valve factory - aline	Factory-set opening pressure of the safety valve
at site	Set opening pressure of the safety valve

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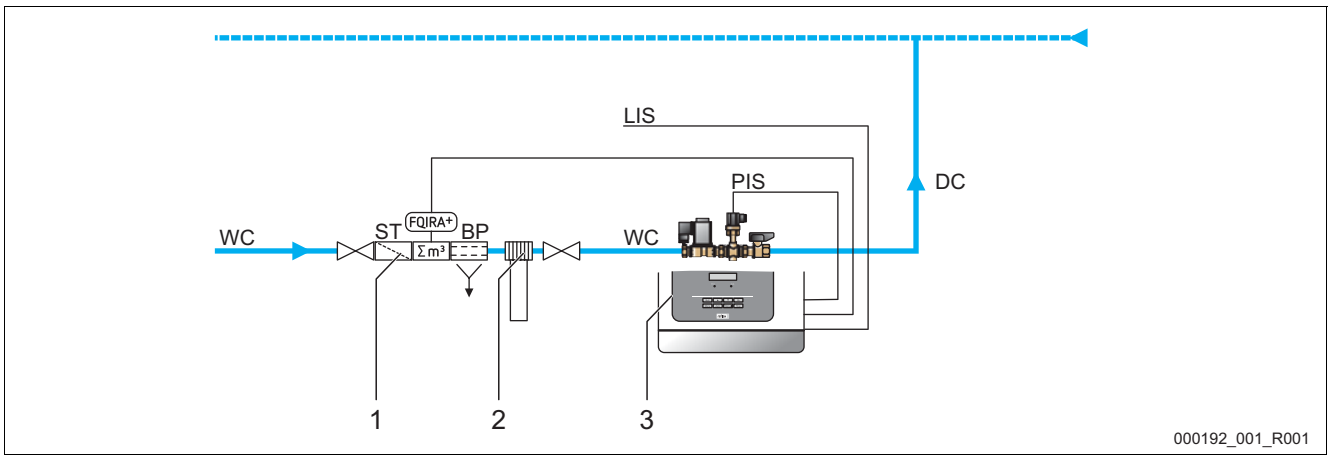
4.3.2 Type code

Type code			
Fillcontrol Plus P	1,4	E	
			– : Standard
			E : Stainless steel model
			Volumetric flow rate "K_{vs}"

4.4 Function



1	Fillset Impuls, see chapter 4.6 "Optional equipment and accessories" on page 12 .
2	"Fillsoft" softening system, see chapter 4.6 "Optional equipment and accessories" on page 12 .
3	Fillcontrol Plus
LIS	Filling level monitoring for level-dependent make-up • External signal line to the controller

PIS	Pressure transducer for pressure-dependent make-up • Internal signal line from the pressure transducer to the controller
WC	Make-up line to the device
DC	Make-up line to the system

Fillcontrol Plus controls the make-up with fresh water for the facility system.

The controller monitors the following functions:

- Make-up time.
- Make-up cycles.
- Make-up quantity, if an optional contact water meter is installed.

The controller will detect small leaks in the system. When a leak is detected, the controller interrupts the make-up with as soon as the make-up time or the make-up cycles are exceeded.

Fillcontrol Plus supports two make-up variants:

- Pressure-dependent make-up with water in a facility system with a diaphragm expansion tank ("Magcontrol" mode).
  - The pressure transducer sends a signal to the controller if the pressure drops below the minimum working pressure of the facility system. The make-up is released. Fresh water is added to the facility system. For calculating the filling pressure into the facility system, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 25 .
- Level-dependent make-up with water in a facility system with a pressure-maintaining station ("Levelcontrol" mode).
  - A pressure-maintaining station monitors the filling level in the expansion tank. If the level drops below minimum, the pressure-maintaining station sends a signal to the controller. The make-up is released. Fresh water is added to the facility system.

The mode is set in the Customer menu, see chapter 9.1.1 "Customer menu" on page 31 .

The controller may monitor additional function, if you combine various accessories.

The following components are available as optional accessories:

- "Reflex Fillsoft" softening system.
- "Reflex Fillset" with "FQI" water meter.
- "Reflex Fillset Imuls" with "FQIRA+" contact water meter.

Note!

For optional accessories, see chapter 4.6 "Optional equipment and accessories" on page 12 .

4.5 Scope of delivery

The scope of delivery is described in the shipping document and the content is shown on the packaging.
Proceed as follows:

1. Immediately after receipt of the goods, please check the shipment for completeness and damage.
2. Please notify us immediately of any transport damage.

Basic make-up equipment:

- The pre-wired device.
- Operating manual.

4.6 Optional equipment and accessories

The following optional equipment and expansion functions are available for this device:

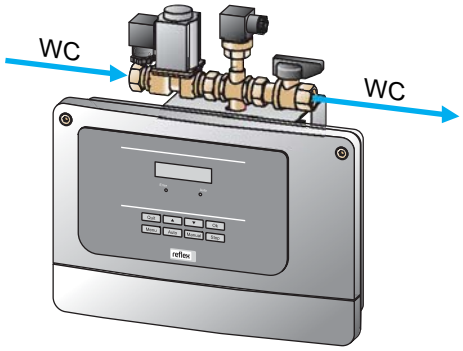
- Fillset or Fillset Compact as add-on modules for drinking water systems.
- Softening with Reflex Fillsoft.
- Expansions for Reflex Basic controllers:
  - I/O modules
  - Bus modules:
    - Lonworks Digital
    - Lonworks
    - Profibus DP
    - Ethernet

Note!
Separate operating instructions are supplied with accessories.

5 Technical data

Make-up station with controller.

- For heating and cooling water systems:
  - With diaphragm expansion tanks.
  - With pressure-maintaining stations.



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Type, Article No.	Fillcontrol Plus / 8812100 Fillcontrol Plus E / 8812200
Width	340 mm
Height	320 mm
Depth	190 mm
Weight	2.5 kg
Permissible gauge operating pressure	10 bar
Permissible operating temperature	90 °C
Permissible ambient temperature	> 0 °C – 45 °C
Volumetric flow rate K_{vs}	1,4 m^3/h
Inlet pressure to "Fillcontrol Plus“	≤ 6 bar (if higher, install a pressure reducer)
Make-up pressure to the system	≤ ?? bar
Degree of protection IP	IP 54
Electrical power supply	
• Output	350 W
• Fusing	4 A
• Voltage	230 V
• Frequency	50 Hz
Connector for make-up line, internal thread (IG)	
• To the device	G 3/4 "
• To the system	G 1/2 "

6 Installation

Danger – electric shock!

- Risk of serious injury or death due to electric shock.
  - Ensure that the system is voltage-free before installing the device.
  - Ensure that the system is secured and cannot be reactivated by other persons.
  - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

Caution – risk of injury!

- If installation, removal or maintenance work is not carried out correctly, there is a risk of burns and other injuries at the connection points, if pressurised hot water or hot steam suddenly escapes.
  - Ensure proper installation, removal or maintenance work.
  - Ensure that the system is de-pressurised before performing installation, removal or maintenance work at the connection points.

Caution – risk of burning!

- Excessively hot surfaces in heating systems can cause burns on the skin.
  - Wear protective gloves.
  - Please place appropriate warning signs in the vicinity of the device.

Caution – Risk of injury due to falls or bumps!

- Bruising from falls or bumps at system components during installation.
  - Wear personal protective equipment (helmet, protective clothing, gloves, safety boots).

6.1 Installation conditions

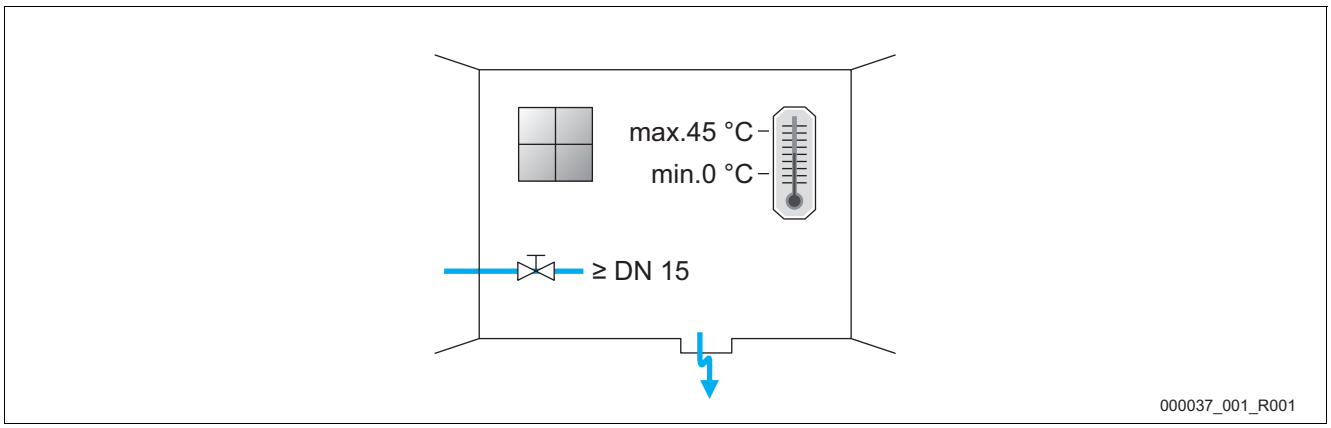
6.1.1 Incoming inspection

Prior to shipping, this device was carefully inspected and packed. Damages during transport cannot be excluded.

Proceed as follows:

1. Upon receipt of the goods, check the shipment for
   - completeness and
   - possible transport damage.
2. Document any damage.
3. Contact the forwarding agent to register a complaint accordingly.

6.2 Preparatory work



Conditions for device installation:

- Frost-free, well-ventilated room.
  - Room temperature range: 0 °C to 45 °C.
- Filling connection.
  - If necessary, provide a DN 15 filling connection according to DIN 1988 T 4.
- Electric connection: 230 V~, 50 Hz, 16 A with upstream ELCB: Tripping current 0.03 A.

6.3 Execution

Attention! – Damage due to improper installation

Bear in mind that the device may be subject to additional stresses through the connection of piping or system equipment.

- Ensure that pipes are connected from the device to the system without stresses being induced.
- If necessary, provide support structures for the pipes or devices.

The device may be installed anywhere within the system if it operated within the permissible pressure and temperature ranges, see chapter 5 "Technical data" on page 13 .

In systems with a diaphragm expansion tank, the device must be installed in the vicinity of the tank to ensure that the filling pressure for the fresh water make-up is recorded by the "PIS" pressure transducer in the device. For calculating the filling pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 25 .

Proceed as follows for the installation:

1. Position the device.
2. Create the water-side connections of the device to the system.
3. Create the interfaces according to the terminal plan.

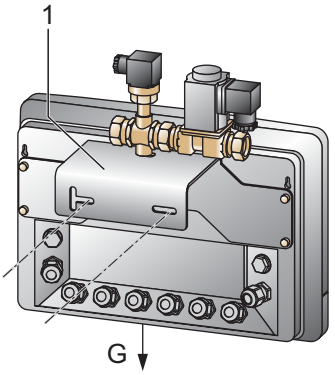
6.3.1 Wall mounting

The device is installed at the wall. Bore holes for wall mounting are provided on the rear of the console (1) housing.

Select the attachment means according to the wall properties and the weight (G) of the device.

During installation, ensure that:

- The device is installed sufficiently close to the diaphragm expansion tank. You ensure so that the "PIS" pressure sensor is able to measure the filling pressure.
- The fixtures can be operated.
- The feed connections of the pipes are not adversely affected.



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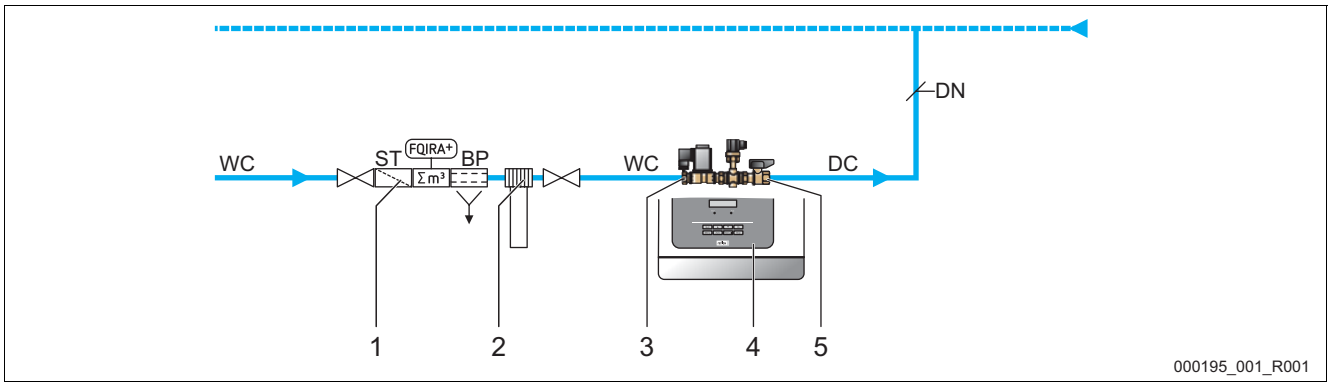
6.3.2 Hydraulic connection

Attention! – Damage due to improper installation

Bear in mind that the device may be subject to additional stresses through the connection of piping or system equipment.

- Ensure that pipes are connected from the device to the system without stresses being induced.
- If necessary, provide support structures for the pipes or devices.



1	Fillset Impuls
2	"Fillsoft" softening system
3	"WV" Make-up valve
4	Fillcontrol Plus

5	"BV" shut-off device
WC	Make-up line to the device
DC	Make-up line to the system
DN	Nominal diameter of the make-up line

Prepare the connection as follows:

1. Select the "DN" nominal diameter for the make-up lines.
   - At a length of up to 10 metres: DN 15.
   - At a length of more than 10 metres: DN 20.
2. Connect the "DC" make-up line to the "BV"shut-off device.
3. Connect the "DC" make-up line to the system.
4. Connect the "WC" make-up line to the "WV" make-up valve.
5. Connect the "WC" make-up line to the external fresh water system.

The make-up lines are connected.

Note!

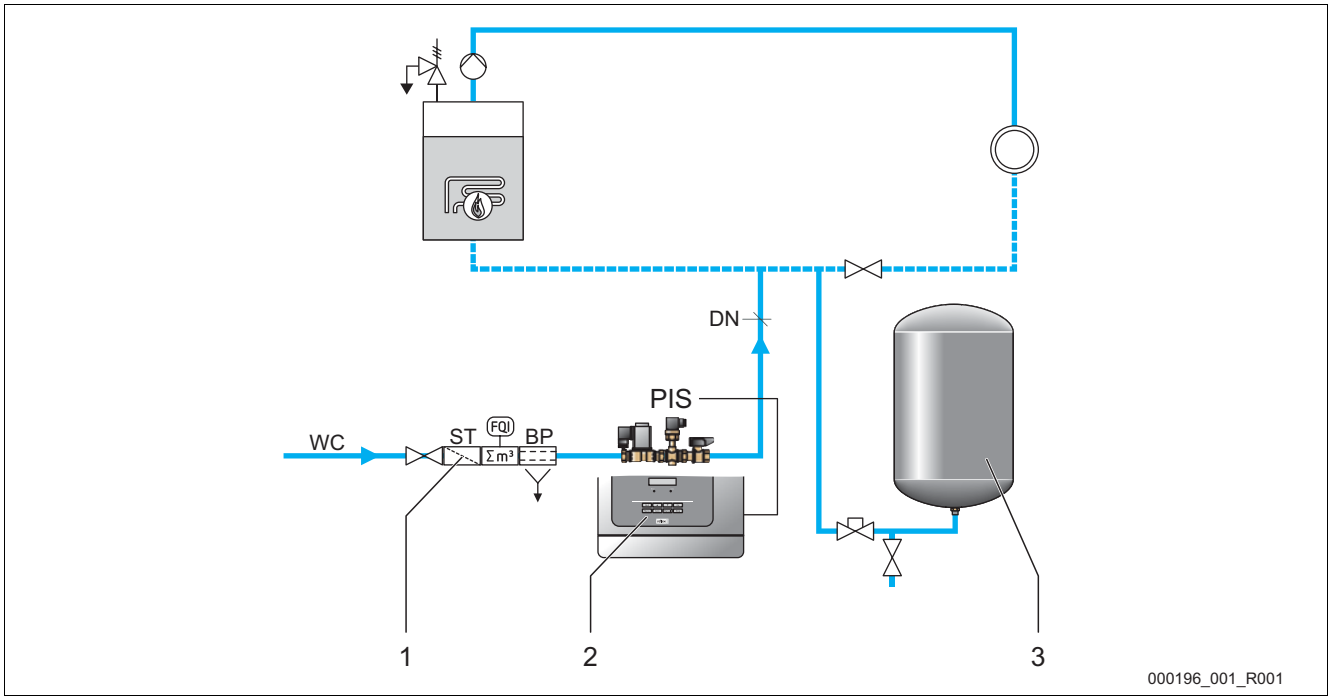
Use a pressure reducer in the "WC" make-up line if the fresh water system pressure exceeds 6 bar.

Note!

For selecting the make-up variants, see chapter 6.4 "Switching and make-up variants" on page 18 .

6.4 Switching and make-up variants

Example of a pressure-dependent make-up with "Fillcontrol Plus".



1	Fillset
2	Fillcontrol Plus
3	Diaphragm expansion tank MAG

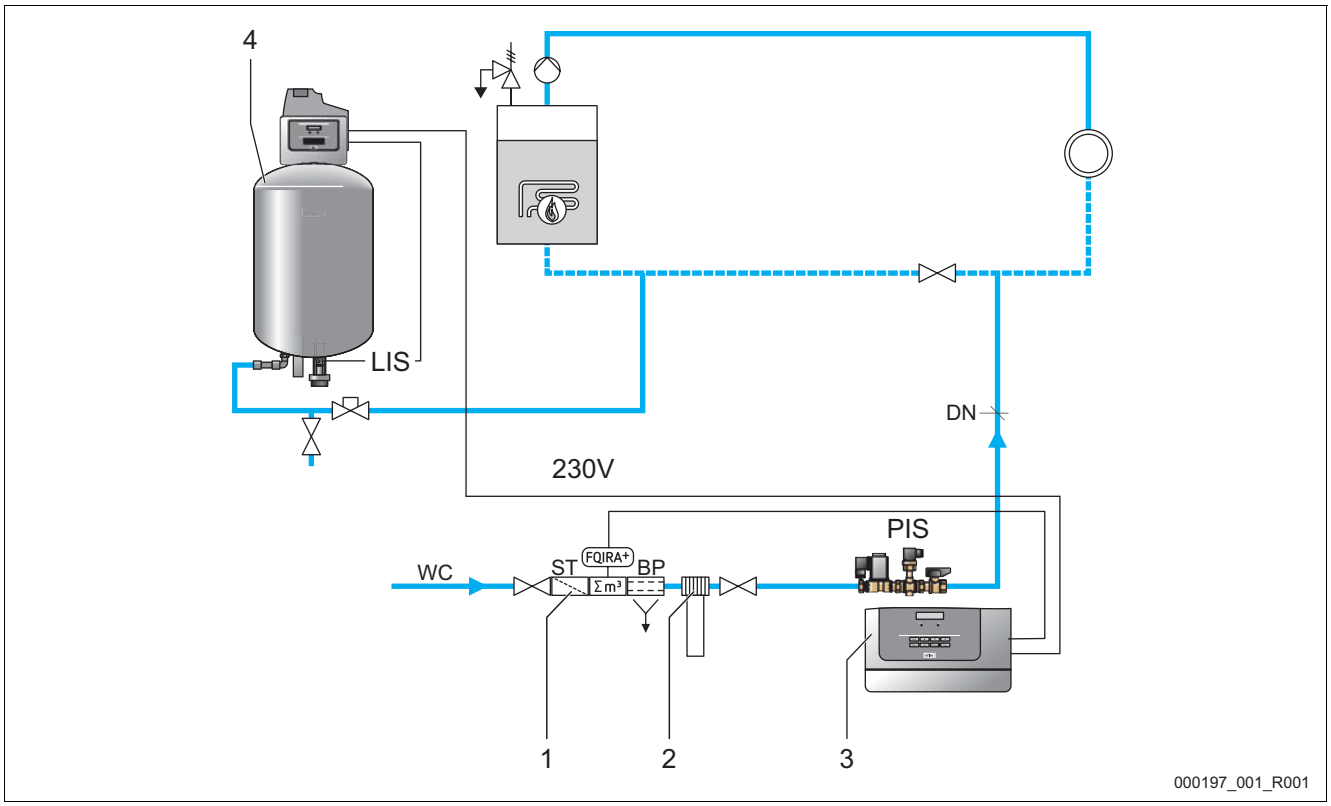
PIS	Pressure transducer
WC	Make-up line to the device
DC	Nominal diameter of the make-up line

In facility systems with a diaphragm expansion tank, the "PIS" pressure transducer in the device monitors the make-up with fresh water. When the required filling pressure for water make-up drops below the minimum value, the pressure transducer sends a signal to the device controller. The make-up is released. Fresh water is added to the facility system.

Proceed as follows:

1. In the Customer menu, activate the "Magcontrol" mode, see chapter 9.1.1 "Customer menu" on page 31 .
2. Connect the pressure line near the connection to the diaphragm expansion tank.
   – This ensures that the "PIS" pressure transducer detects the filling pressure required for the make-up with fresh water.
   – For calculating the filling pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 25 .
3. Do not use nominal diameters below the specified diameters for the "WC"make-up lines.
   – You will avoid an undesired cycling of the make-up.

Example of a level-dependent make-up with "Fillcontrol Plus".



1	Fillset Impuls
2	"Fillsoft" softening system
3	Fillcontrol Plus

4	"Reflexomat" pressure maintaining station
WC	Make-up line to the device
DN	Nominal diameter of the make-up line

The pressure maintaining station is fitted with a monitoring device for the filling level in the expansion tank. If the filling level drops below the minimum level in the expansion tank, the pressure maintaining station sends a signal to the device controller. The make-up is released. Fresh water is added to the facility system.

Proceed as follows:

1. In the Customer menu, activate the "Levelcontrol" mode, see chapter 9.1.1 "Customer menu" on page 31 .
2. The filling pressure for make-up with fresh water must be at least 1.7 bar higher than the "P_0" minimum working pressure, see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 25 .

Note!

You may combine the device with softening systems (Fillsoft, for example); available as optional accessories, see chapter 4.6 "Optional equipment and accessories" on page 12 .

6.5 Electrical connection

Danger – electric shock!

- Risk of serious injury or death due to electric shock.
  - Ensure that the system is voltage-free before installing the device.
  - Ensure that the system is secured and cannot be reactivated by other persons.
  - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

Danger – electric shock!

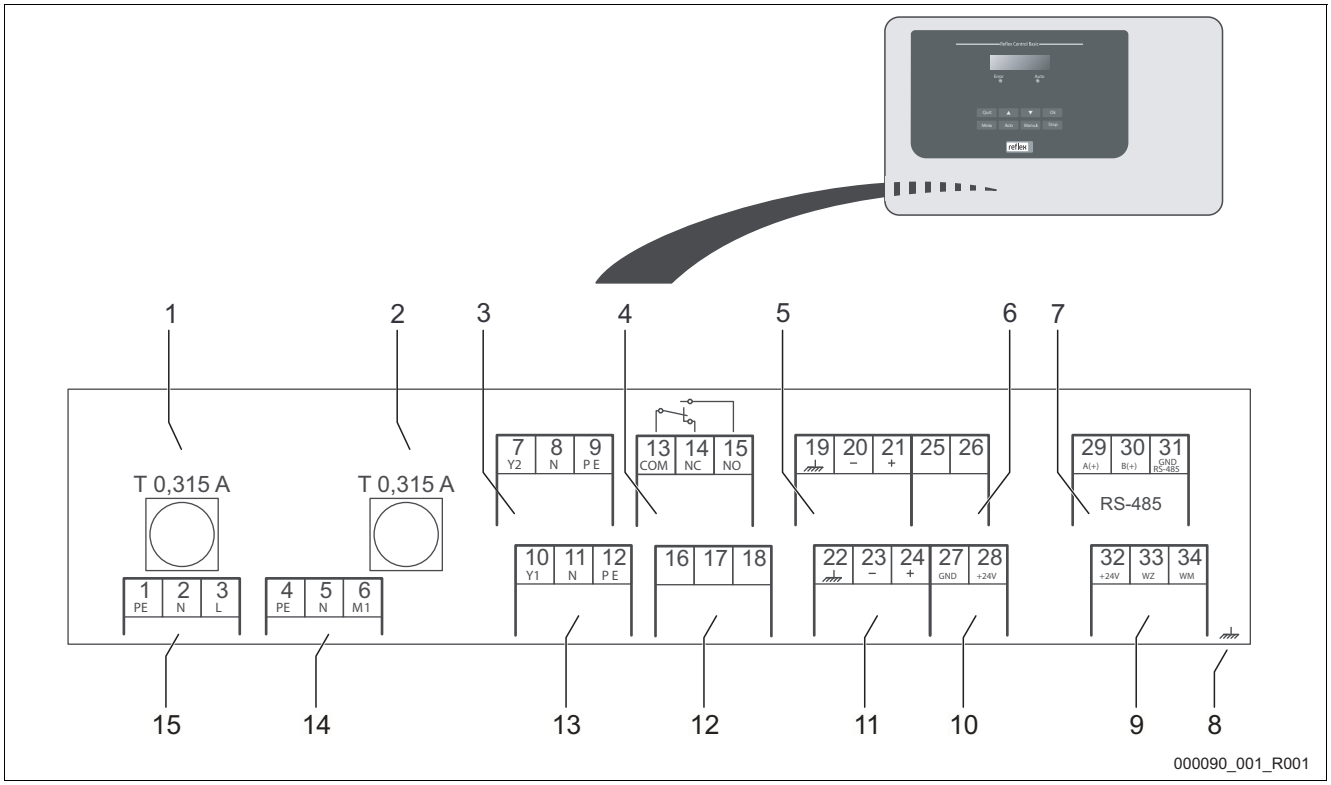
- Risk of serious injury or death due to electric shock. Some parts of the main board may still carry 230V voltage even with the device physically isolated from the 230 V power supply.
  - Before you remove the covers, completely isolate the device controller from the power supply.

The following descriptions apply to standard systems and are limited to the necessary user-provided connections.

1. Disconnect the system from the power source and secure it against unintentional reactivation.
2. Remove the cover.
3. Install a screwed cable gland suitable for the respective cable. M16 or M20, for example.
4. Thread all cables to be connected through the cable gland.
5. Connect all cables as shown in the terminal diagram, see chapter 6.5.1 "Terminal diagram" on page 21 .
   - Note that the fusing for the device connection is to be provided by the user, see chapter 5 "Technical data" on page 13 .
6. Install the cover.
7. Connect the mains plug to the 230 V power supply.
8. Activate the system.

The electrical connection is completed.

6.5.1 Terminal diagram



1	"L" fuse for electronics and solenoid valves
2	"N" fuse for solenoid valves
3	Solenoid valve (not for motor ball valve)
4	Group message
5	Not used
6	Not used
7	RS-485 interface
8	Shielding

9	Digital inputs • Water meter • Insufficient water
10	Not used
11	Pressure analogue input
12	External make-up demand ("Levelcontrol" only)
13	Not used
14	Not used
15	Mains supply

Terminal number	Signal	Function	Wiring
1	PE	230 V power supply via mains cable and plug.	Pre-wired
2	N		
3	L		
4	PE	Not used.	
5	N		
6	M1		
10	Y1	Not used.	
11	N		
12	PE		
13	COM	Group message (floating).	User, optional
14	NC		
15	NO		
16	Not assigned	External make-up demand for level-dependent make-up. • From a pressure maintaining station, for example. (Set the controller to "Levelcontrol")	User, optional
17	Make-up (230 V)		
18	Make-up (230 V)		
19	PE shield	Not used.	
20	- Level (signal)		
21	+ Level (+ 18 V)		
22	PE (shield)	Pressure analogue input. • Display at the controller. • Activation of the make-up. – For the "Magcontrol" make-up variant	Pre-wired
23	- Pressure (signal)		
24	+ Pressure (+ 18 V)		
25	0 – 10 V (correcting variable)	Not used.	
26	0 – 10 V (feedback)		
27	GND		
28	+ 24 V (supply)		
29	A	RS-485 interface.	User, optional
30	B		
31	GND		
32	+ 24 V (supply)	Supply for E1 and E2.	Pre-wired, bridged
33	E1	Contact water meter (in "Fillset Impuls", for example), see chapter 4.6 "Optional equipment and accessories" on page 12 . • Evaluation of the make-up. • Contact 32/33 closed = meter pulse.	User, optional
34	E2	Not used.	Pre-wired, bridged

6.5.2 RS-485 interface

The following options are available via the interface:

- Data polling by the controller.
  - Pressure
  - Pump operating states.
  - Cumulated quantity of the "FQIRA+" contact water meter.
  - Al messages, see chapter 9.2 "Messages" on page 36 .
  - All entries in the fault memory.
- Communication with control centres.
- Communication with other equipment.

Note!

If required, please request the RS-485 interface protocol from the Reflex Customer Service.

- Connection details.
- Accessory information and data.

6.5.2.1 Connecting the RS-485 interface

Connect the interface as follows:

1. For connecting the interface use only a cable with these properties:
   - LJYCY (TP), 4 × 2 × 0.8, maximum overall bus length 1000 m.
2. Use a shielded cable to connect the interface to terminals 29, 30, 31 of the main board in the control cabinet.
   - For connecting the interface, see chapter 6.5 "Electrical connection" on page 20 .
3. When using the device with a control centre not supporting an RS-485 interface (RS-232, for example), you must use a corresponding adapter.

6.6 Installation and commissioning certificate

Notice!

The proper installation and commissioning must be confirmed in the installation, commissioning and maintenance certificate. This certificate is prerequisite for any warranty claim.

– Have the Reflex Customer Service carry out commissioning and the annual maintenance.

Data shown on the nameplate:	P_0
Type:	P_{SV}
Serial number:	

This device has been installed and commissioned in accordance to the instructions provided in the Operating Manual. The settings in the controller match the local conditions.

Note!

When any factory-set values of the device are changed, you must enter this information in the Maintenance certificate, see chapter 10.3 "Maintenance certificate " on page 40 .

For the installation

Place, date	Company	Signature

For the commissioning

Place, date	Company	Signature

7 Commissioning

Notice!

The proper installation and commissioning must be confirmed in the installation, commissioning and maintenance certificate. This certificate is prerequisite for any warranty claim.

– Have the Reflex Customer Service carry out commissioning and the annual maintenance.

7.1 Checking the requirements for commissioning

The device will be ready for commissioning when the tasks described in the "Installation" chapter have been completed. Comply with the information below on commissioning:

- The device is installed.
- The water connections to the facility system are established.
- The device shut-off valves are closed.
  – Shut-off valve from the "DC" make-up line to the facility system.
  – Shut-off valve from the "WC" make-up line to the fresh water system.
- "PIS“ pressure monitoring is ready.
- The electrical connection has been created according to applicable national and local regulations.

Establish a 230 V power supply by plugging the power plug into a corresponding outlet. The controller is in Stop mode.

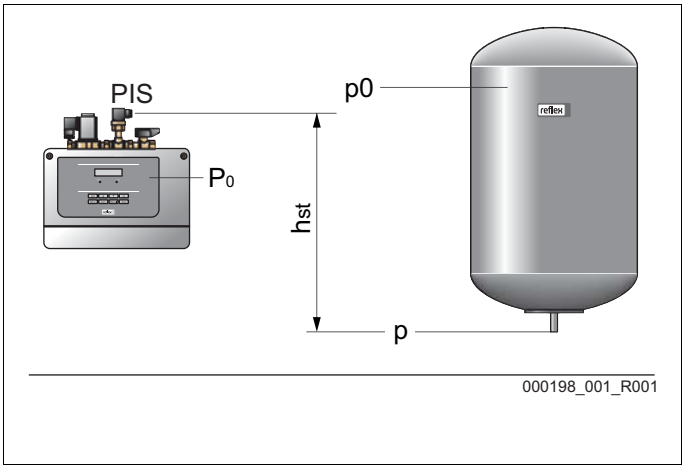
7.2 Determining the P_0 minimum operating pressure for the controller

The "P_0“ minimum working pressure for the device is used in facility systems with a diaphragm expansion tank.

Calculate the "P_0“ minimum working pressure for the device:

- The device is installed at the same level (h_{st} = 0) as the diaphragm expansion tank:
  $P_0 = p0$
- The device is installed at a lower level than the diaphragm expansion tank:
  $P_0 = p0 + h_{st} / 10$
- The device is installed at a higher level than the diaphragm expansion tank:
  $P_0 = p0 - h_{st} / 10$

P_0 Minimum working pressure in bar
p0 Initial pressure, diaphragm expansion tank, in bar
h_{st} Static elevation in m



Note!

Calculate the filling pressure for the make-up with fresh water into the system as follows:

Filling pressure ≥ P_0 + 0.3 bar

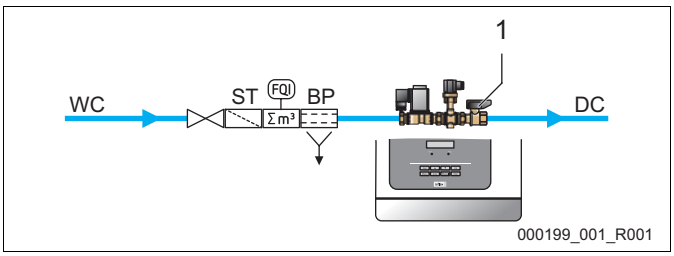
Note!

During planning, take into account that the working range of the device must be between the "PA" initial pressure and the "PE" final pressure in the working range of the pressure maintenance.

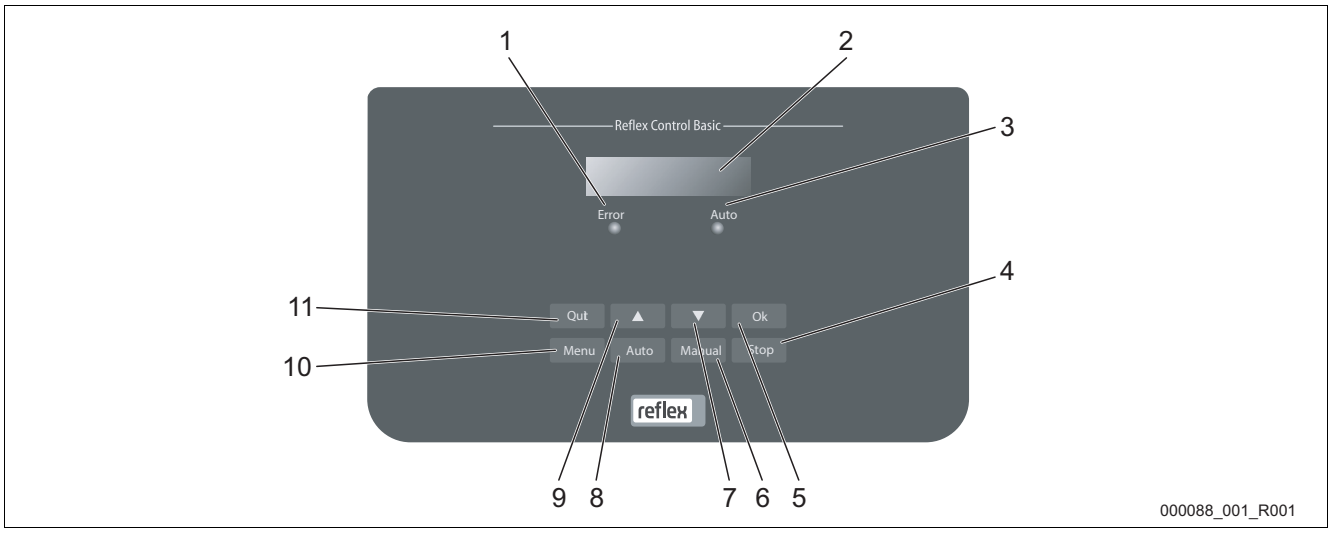
7.3 Filling the device with water

Proceed as follows:

1. Connect the "BV" shut-off device (1) to the facility system.
2. Carefully open the shut-off device in the "WC" fresh water line.



7.4 Operator panel



1	Error LED • The Error LED illuminates in the event of a fault
2	Display
3	Auto LED • The Auto LED illuminates green in Automatic mode • The Auto LED flashes green in Manual mode • The Auto LED is not illuminated when the system is stopped
4	Stop • For commissioning and entry of new values in the controller
5	OK • Confirm actions
6	Manual • For tests and maintenance tasks

7	"Back" to the previous menu
8	Auto • For continuous operation
9	"Forward" to the next menu
10	Menu • Call up the Customer menu
11	Quit • Acknowledge messages

Selecting and changing parameters

1. Use "OK" (5) to select the parameter.
2. Use the arrow buttons (7) or (9) to change the parameter value.
3. Use "OK" (5) to confirm the parameter.
4. Use the arrow buttons (7) or (9) to change the menu option.
5. Use "Quit" (11) to switch to a different menu level.

7.5 Parametrising the controller in the Customer menu

Use the Customer menu to display or correct system-specific values. In the course of commissioning, the factory settings must be adjusted for the system-specific conditions.

– For adjusting the default settings, see chapter 9.1 "Configuring settings in the controller" on page 31 .
– For information about controller operation, see chapter 7.4 "Operator panel" on page 26 .

7.6 Function test

Perform a function test for the "WV" make-up valve.

• Set the device controller to manual mode, see chapter 8.1.2 "Manual mode" on page 29 . In manual mode, you can manually open and close the "WV" make-up valve.

Proceed as follows:

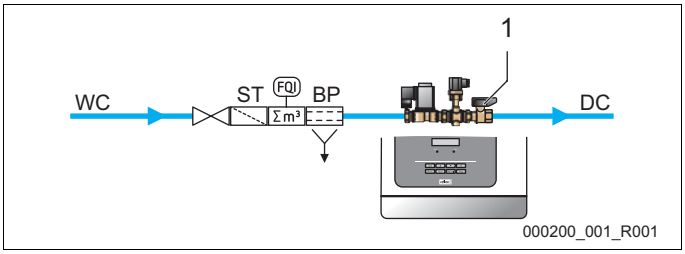
1. Press "Manual".
   – "Levelcontrol" mode: "WV" flashes at the display.
   – "Magcontrol" mode: Use the arrow keys to select "WV". "WV" flashes at the display.
2. Press "OK".
   – The make-up valve opens. The displays shows "WV!".
   – The water pressure displayed rises to the water pressure in the fresh water line.
   – The make-up is completed when the value at the display no longer increases. The make-up valve automatically closes after 10 s.
3. Press "OK".
   – The make-up valve closes. The displays shows "WV".

The function test of the "WV" make-up valve is completed.

7.7 Filling system with device

In a pressure-dependent make-up, you have the option to use the device to fill the facility system with water. The following prerequisites must be met:

- The facility system is not yet filled with water.
- The facility system has a maximum water volume of 30000 litres.
- The shut-off valve to the facility system is open.
  – Carefully open the "BV“ (1) shut-off valve.



Set the controller as follows:

- Select "Magcontrol" make-up, see chapter 9.1.1 "Customer menu" on page 31 .
- Select Manual mode, see chapter 8.1.2 "Manual mode" on page 29 .

Proceed as follows:

	2.0 bar
WV	Filling!

1. Press "Manual".
2. Use the arrow keys to select "Filling".
   – "Filling" flashes at the display.
3. Press "OK".
   – The system starts the filling process. The displays shows "Filling".
   – The controller calculates the required filling pressure. As soon as the filling pressure has been attained, the controller automatically stops the filling process.

The facility system is filled with water.

Note!

Monitor the system for the entire automatic filling process.

Note!

If the maximum filling time (10 hours by default) is exceeded, the system aborts the make-up process with an error message, see chapter 9.2 "Messages" on page 36 .

- Press "Quit" at the operator panel to acknowledge the fault message when the fault has been eliminated. The system continues the filling process.

7.8 Starting Automatic mode

Automatic operation can be started after initial commissioning. The following prerequisites must be met for automatic operation:

- "P_0" minimum working pressure is entered in the controller.
- The device is filled with water.
- All required parameters are defined in the controller.
- The function test has been concluded.

Start the automatic mode at the operator panel of the controller:

- Press "Auto" for automatic operation.
  - The "Auto" LED at the operator panel illuminates to visually signal automatic operation.

Notice!

The commissioning process is now concluded.

8 Operation

8.1 Operating modes

8.1.1 Automatic mode

In automatic mode, the device is switched in continuous operation. To start the automatic operation, proceed as follows:

1. Press "Auto" on the controller's operator panel.

The "Auto" LED at the operator panel illuminates to visually signal continuous operation. The controller monitors the make-up functions.

8.1.2 Manual mode

Manual mode is used to test the functions during commissioning and to service the device. The functions available for selection depend on the set mode, "Levelcontrol" or "Magcontrol".

The following functions can be selected manually:

- In "Levelcontrol" mode: Manual opening and closing the "WV" make-up valve.
- In "Magcontrol" mode: Manual opening and closing the "WV" make-up valve or "Filling".

Proceed as follows to test the functioning in "Levelcontrol" mode:

1. Press "Manual".
   – The "Auto" LED flashes.
   – "WV" flashes at the display.
2. Press "OK".
   – The make-up valve opens. The displays shows "WV!".
3. Press "OK".
   – The make-up valve closes. The displays shows "WV".

Proceed as follows to test the functioning in "Magcontrol" mode:

1. Press "Manual".
   – The "Auto" LED flashes.
2. Use the arrow keys to select "WV" or "Filling".
   – "WV" or "Filling" flashes at the display.
3. Press "OK".
   – The make-up valve opens or the filling process is started. The displays shows "WV!" or "Filling".
4. Press "OK".
   – The make-up valve closes or the filling process is stopped. The displays shows "WV" or "Filling".

Note!

The controller calculates the pressure required for filling. As soon as this value has been attained, the controller automatically stops the filling process.

Note!

Manual operation can not be performed if safety-relevant parameters are exceeded.

- The switch is blocked.

8.1.3 Stop mode

Use Stop mode to shut the device down. The controller no longer monitors the functioning of the make-up. Except for the display of information, the device is non-functional in Stop mode.

To execute the Stop mode, proceed as follows:

1. Press "Stop" on the controller's operator panel.
   – The controller shuts down the pump.

Note!

The system returns an alarm if the Stop mode is activated for more than 4 hours.

– If "Floating alarm contact?" in the Customer menu is set to "Yes", the system outputs the alarm to the group alarm contact.

Note!

Select Stop mode for device commissioning.

8.1.4 Summer operation

The make-up with fresh water must be ensured even outside of the operation of the heating and cooling systems. Do not shut down the device when the pressure maintaining systems of the heating and cooling systems are in operation.

9 Controller

9.1 Configuring settings in the controller

9.1.1 Customer menu

Use the Customer menu to display or correct system-specific values. In the course of commissioning, the factory settings must be adjusted for the system-specific conditions.

Proceed as follows:

1. Press "Manual" to switch to manual operation.
2. Press "Menu" to display the first main menu option "Customer menu".

You are in the "Customer menu" main menu.

To navigate and set the values:

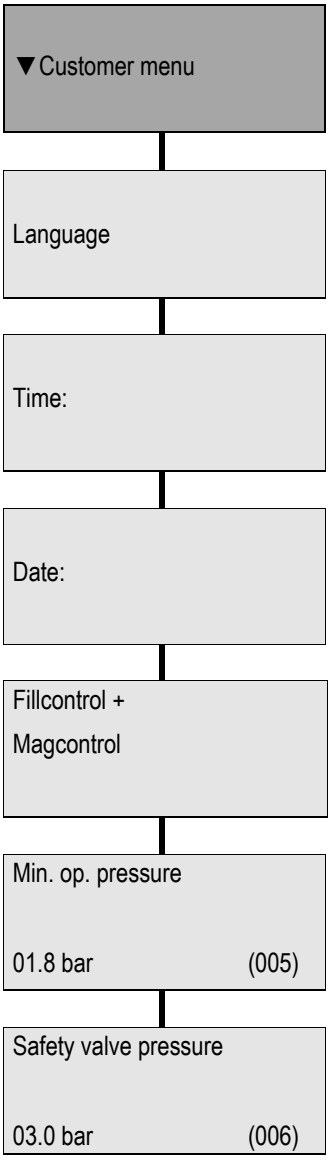
– Use the "▼▲" arrow keys to navigate and set the values in the selected main menu.
– Press "OK" to open the next sub-menu.
– Press "OK" to confirm the changed setting in the sub-menu.

Note!

For a description of the operation, see chapter 7.4 "Operator panel" on page 26 .

You are in the "Customer menu" main menu.

1. Use the "▼▲" arrow keys to open the "Language" sub-menu.



2. Press "OK" and change the desired language.
3. Press "OK" and change the displayed "Hour", "Minute" and "Second". The active value to be changed flashes.
   – This time is used for entries in the fault memory.
4. Press "OK" and change the displayed "Day", "Month" and "Year". The active value to be changed flashes.
   – This date is used for entries in the fault memory.
5. Press "OK" and select the required make-up variant, "Levelcontrol" or "Magcontrol".

The system displays the "Minimum working pressure" message when you have set the "Magcontrol" make-up variant.

6. Press "OK" and enter the minimum working pressure.

The system displays the "Safety valve pressure" message when you have set the "Magcontrol" make-up variant.

7. Press "OK" and enter the actuating pressure for the safety valve.
   – Refer to the facility system for specifying the actuating pressure of the safety valve.

8. Press "OK" and switch into the "Make-up" main menu.
   – Use the "▼▲" arrow keys to navigate and set the values in the selected main menu.

9. Use the "▼▲" arrow keys to open the "Make-up" sub-menu.
   – Press "Quit" to return to the previous main menu option.

10. Press "OK" and change the time for a make-up cycle, if required.
    – Upon expiry of the set time, the system interrupts the make-up and returns the "Make-up time" fault message.

11. Press "OK" and change the number of make-up cycles, if required.
    – If the set number of make-up cycles is exceeded within 2 hours, the system interrupts the make-up and returns the "Make-up cycles" fault message.

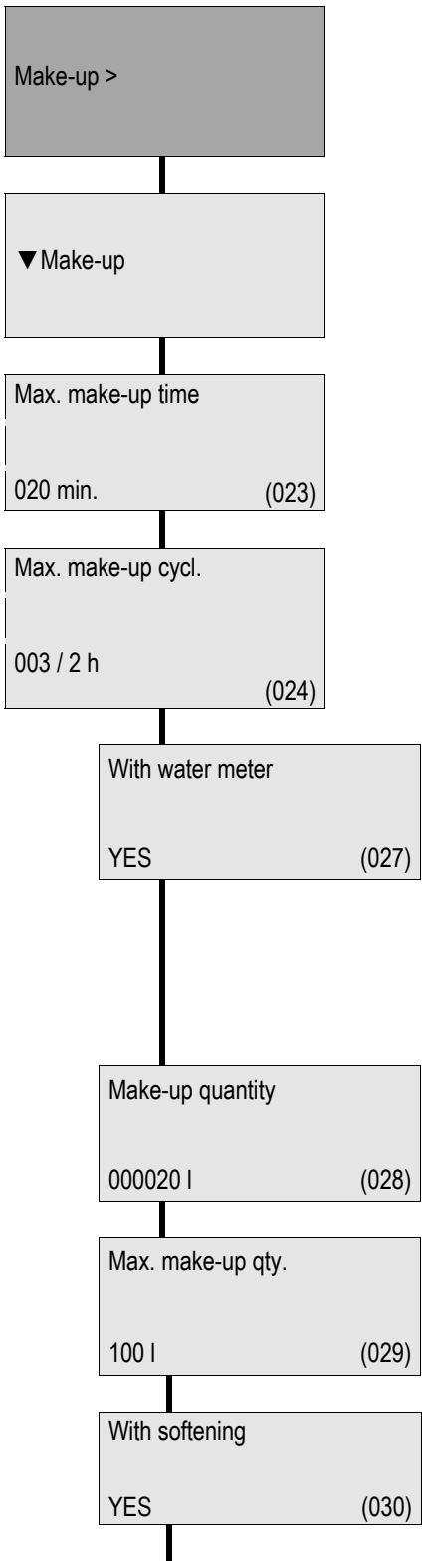
12. Press "OK" and select a setting for "With water meter":
    – Yes: FQIRA+ contact water meter is installed, see chapter 4.6 "Optional equipment and accessories" on page 12 . This is the prerequisite for the make-up quantity monitoring and the operation of a softening system.
    – NO: A contact water meter is not installed (standard model).

The following sub-menus are only displayed if "YES" has been set in the "With water meter" menu option.

13. Press "OK" to select "Make-up quantity".
    – Press "YES" to reset the value displayed to "0".
    – Press "No" to retain the displayed value.

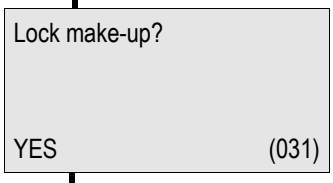
14. Press "OK" to select "maximum make-up quantity" and change the quantity, if required.
    – When the set quantity is reached, the system interrupts the make-up process and returns the error message "Max. make-up quantity exceeded".

15. Press "OK" and change the setting for "With softening", if required.
    – YES: The system offers more queries regarding the softening process.
    – NO: The system does not offer more queries regarding the softening process.



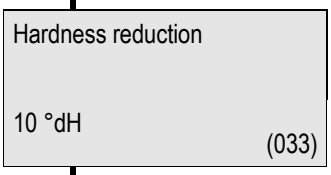
The following sub-menus are only displayed if "YES" has been set in the "With softening" menu option.

16. Press "OK" and change the setting for "Lock make-up", if required.
    - YES: The system stops the make-up process when the set soft water capacity is exceeded.
    - NO: The system does not stop the make-up process. The system displays the "Softening" message.

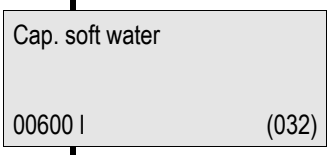


17. Press "OK" and enter the value for hardness reduction.
    - Hardness reduction is calculated from the difference of the overall water hardness GH_{actual} and the target water hardness GH_{target}.

    Hardness reduction = GH_{actual}-GH_{target}l °dH.
    - Consult the manufacturer information for the values of third-party products.

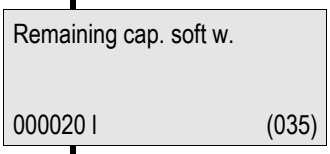


18. Press "OK" and enter the value for attainable soft water capacity.
    - The attainable soft water capacity is calculated from the type of softening used and the specified hardness reduction.
    - Fillsoft I, soft water capacity ≤ 6000/hardness red. l
    - Fillsoft II, soft water capacity ≤ 12000/hardness red. l
    - Consult the manufacturer information for the values of third-party products.

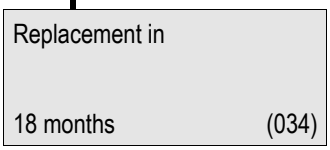


The value of the remaining soft water capacity is only displayed. It cannot be set and is calculated from the hardness reduction and the soft water capacity.

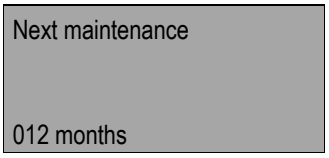
19. Press the "▼▲" arrow keys to switch into the next menu option.



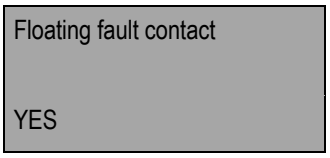
20. Press "OK" and enter the time for replacing the softening cartridge.
    - Enter the time interval specified by the manufacturer. The system displays the "Softening" message when this interval has expired.
    - The time interval for cartridge replacement is independent od the calculated soft water capacity.



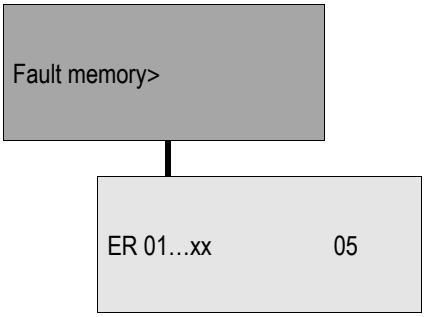
21. Press "OK" and select a setting for "Next maintenance":
    - OFF: Without maintenance recommendation.
    - 001 – 060: Maintenance recommendation in months.



22. Press "OK" and select a setting for "Floating fault contact":
    - YES: For the output of all messages to the floating contact.
    - NO: Output of all messages identified with "xxx" ("01", for example).

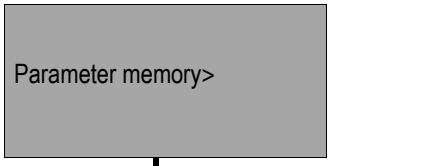


23. Press "OK" and switch into the "Fault memory" main menu.
    – Use the "▼▲" arrow keys to navigate and set the values in the selected main menu.

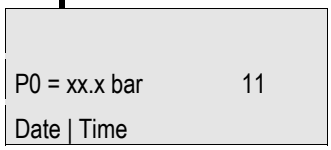


24. Use the "▼▲" arrow keys to call the last 20 messages.
    – The system stores the fault type, date, time and fault code.
    – For a list of the ER fault codes and their meaning, see chapter 9.2 "Messages" on page 36 .

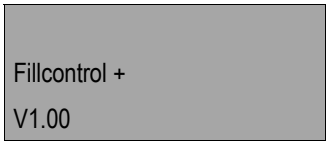
25. Press "OK" and switch into the "Parameter memory" main menu.
    – Use the "▼▲" arrow keys to navigate and set the values in the selected main menu.



26. Use the "▼▲" arrow keys to call the last 10 entries for the "P0" minimum working pressure.
    – The last 10 entries of the minimum working pressure are stored with date and time.



Information about the software version



9.1.2 Service menu

This menu is protected with a password. It can be accessed only by the Reflex Customer Service. A partial summary of the settings stored in the Service menu is proved in the Chapter Default settings, see chapter 9.1.3 "Default settings" on page 35 .

9.1.3 Default settings

The device controller is shipped with the following default settings. Use the Customer menu to adjust these values to local conditions. In special cases, it is possible to further adjust the values in the Service menu.

Customer menu

Parameter	Setting	Remarks
Language	EN	Display language
Fillcontrol Plus	Magcontrol	For systems with diaphragm-type pressure expansion tank
Minimum operating pressure p0	1.5 bar	Only Magcontrol see chapter 7.2 "Determining the P_0 minimum operating pressure for the controller" on page 25 .
Safety valve, pressure	3.0 bar	Pressure value for the safety valve of the heat generator in the system to trip
Next maintenance	12 months	Time left to the next due maintenance
Floating alarm contact	NO	Only the messages marked in the "Messages" list
Make-up		
Maximum make-up quantity	1000 Litres	Only if controller with "With water meter yes"
Maximum make-up time	20 minutes	Magcontrol
Maximum make-up cycles	3 cycles within 2 hours	Magcontrol
Softening (Only if "With softening yes")		
Lock make-up	No	In the case of soft water residual capacity = 0
Hardness reduction	8°dH	= Target – Actual
Maximum make-up quantity	0 Litres	Attainable make-up quantity
Soft water capacity	0 Litres	Attainable water capacity
Cartridge replacement	18 months	Replace cartridge

Service menu

Parameter	Setting	Remarks
Make-up		
Pressure differential, "NSP" make-up	0.2 bar	Only Magcontrol
Pressure differential, filling pressure PF – P_0	0.3 bar	Only Magcontrol
Water quantity for each contact	10 l / K	Only if a water meter is installed. (Fillset Impulse, for example)
Maximum filling contacts	OFF	Limits the filling volume. Only if a water meter is installed. (Fillset Impulse, for example)

9.2 Messages

Messages with ER codes are displayed at the controller.

- Use the arrow keys at the controller operating panel to select the messages.
- By selecting the "Fault memory" main menu in the Customer menu, you display the last 20 alarms.
- Alarm causes can be eliminated by the operator or a specialist workshop.
- If required, please contact the Reflex Customer Service.

Note!

Confirm the elimination of the fault by pressing "Quit" at the controller operator panel. All other alarms are automatically reset as soon as the cause has been eliminated.

Note!

Group messages are issued via a floating contact which is set in the Customer menu, see chapter 7.5 "Parametrising the controller in the Customer menu" on page 27 .

ER Code	Alarm	Group message	Causes	Remedy	Alarm reset
01	Min. pressure	YES	The set value for the "P_0" minimum working pressure has been exceeded. • Water loss in the system. • Expansion tank defective.	• Check the system for leaks. • Replace the expansion tank. • Check the function in manual mode.	"Quit"
06	Make-up time		Set time for the make-up time has been exceeded. • Severe water loss in the system. • Make-up line not connected. • Make-up rate insufficient. • Make-up hysteresis too high.	• Check the system for leaks. • Connect the make-up system. • Check the make-up rate. • Check the make-up hysteresis.	"Quit"
07	Make-up cycles		Set value for the make-up cycles has been exceeded. • Leakage in the system.	• Check the system for leaks.	"Quit"
08	Pressure measurement	YES	Controller receives incorrect signal. • Pressure transducer plug not plugged in. • Broken wire from "PIS“ pressure transducer. • "PIS" pressure transducer defective.	• Plug in the plug. • Replace the wire. • Replace the "PIS“ pressure transducer.	"Quit"
10	Maximum pressure		Set value for the maximum pressure has been exceeded. • Safety valve defective. • Insufficient dimensioning of the pipeline to the system.	• Check the actuating pressure of the safety valve. • Replace the safety valve. • Increase the diameter of the pipeline to the system.	"Quit"

ER Code	Alarm	Group message	Causes	Remedy	Alarm reset
11	Make-up quantity		Set value of the water meter has been exceeded. • Leakage in the system. • Water quantity per contact incorrectly set in the Service menu.	• Check the system for leaks. • Check the set value.	"Quit"
12	Filling time		Set value for the maximum filling time has been exceeded. • System volume too large (≤ 3000Liter).	• Restart the filling process	"Quit"
13	Filling volume		• System volume too large (≤ 3000Liter). • Water quantity per contact incorrectly set in the Service menu.	• If necessary, restart the filling process • Set the water quantity per contact in the Service menu.	"Quit"
15	Make-up valve		Make-up without demand • "WV" make-up valve leaking	• Replace the "WV" make-up valve	
16	Power failure		No power.	Check power supply.	–
19	Stop > 4 h		The device is in Stop mode for more than 4 hours.	Select Automatic mode.	–
20	Max. Make-up volume		Set value for the make-up quantity has been exceeded.	Reset the "Make-up quantity" meter in the Customer menu.	"Quit"
21	Maintenance recommended		Set value exceeded.	Carry out maintenance.	"Quit"
24	Softening		• Set value for the water capacity has been reached. • Time interval for replacement of the softening cartridge has been reached.	Replace the softening cartridge.	"Quit"
30	I/O module fault		• I/O module defective. • Connection between option card and controller faulty. • Option card defective.	Contact the Reflex Customer Service.	
31	EEPROM defective	YES	• EEPROM defective. • Internal calculation error.	Contact the Reflex Customer Service.	"Quit"
32	Undervoltage	YES	Supply voltage too low.	Check power supply.	
33	Adjustment parameter faulty		EPROM parameter memory defective.	Contact the Reflex Customer Service.	
34	Main board communication faulty		• Connecting cable defective. • Main board defective.	Contact the Reflex Customer Service.	
35	Digital input voltage faulty		Short-circuit of input voltage.	Check the wiring at the digital inputs (water meter, for example).	
36	Analogue input voltage faulty		Short-circuit of input voltage.	Check the wiring at the analogue inputs (pressure/level).	

10 Maintenance

Danger – electric shock!

- Risk of serious injury or death due to electric shock.
  - Ensure that the system is voltage-free before installing the device.
  - Ensure that the system is secured and cannot be reactivated by other persons.
  - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

Caution – risk of burning!

- Risk of burning due to escaping medium.
  - Maintain a sufficient distance from the escaping medium.
  - Wear suitable personal protective equipment (safety gloves and goggles).

Caution – risk of injury!

- Incorrect installation or service work may cause burns and other injuries at the connections when hot water or steam suddenly escape at pressure.
  - Ensure proper disassembly.
  - Ensure that the system is de-pressurised before performing the disassembly.

Note!

Ensure that maintenance is carried out annually.

- In specific cases, the maintenance intervals depend on the operational conditions.

Note!

The annual maintenance is displayed upon expiry of the set operating time.

- Use the "Quit" button to confirm the "Maintenance received" message.
- Reset the maintenance counter in the Customer menu.

Note!

Maintenance tasks must be carried out only by specialist personnel or the Reflex Customer Service.

- Confirm the maintenance tasks, see chapter 10.3 "Maintenance certificate " on page 40 .

10.1 Maintenance schedule

The maintenance schedule is a summary of maintenance tasks to be carried out regularly.

Maintenance task	Conditions			Interval
▲ = Check, ■ = Service, ● = Clean				
Check for leaks, see chapter 10.2 "Exterior leak test" on page 39 . • Screw connections.	▲	■		Annually
Check the make-up function, see chapter 7.6 "Function test" on page 27 .	▲			Annually
Check the system-specific setting values in the controller, see chapter 9.1.1 "Customer menu" on page 31 . • Mindestbetriebsdruck „P_0“. • "P_{SV}“ safety valve pressure.	▲			Annually

Note!

Compare the minimum working pressure with the initial pressure in the diaphragm expansion tank.

– If necessary, adjust the initial pressure in the diaphragm expansion tank.

10.2 Exterior leak test

Check the following device components for leaks:

– "PU“ pumps and screw fittings.
  - Seal any leaks at the connections or replace the connections, if required.
  - Seal leaking screw connections or replace, if required.

10.3 Maintenance certificate

All maintenance tasks have been completed according to the Reflex Installation, Operating and Maintenance Manual.

Date	Service organisation	Signature	Remarks

11 Disassembly

Danger – electric shock!

- Risk of serious injury or death due to electric shock.
  - Ensure that the system is voltage-free before installing the device.
  - Ensure that the system is secured and cannot be reactivated by other persons.
  - Ensure that installation work for the electric connection of the device is carried out by an electrician, and in compliance with electrical engineering regulations.

Danger – electric shock!

- Risk of serious injury or death due to electric shock. Some parts of the main board may still carry 230V voltage even with the device physically isolated from the 230 V power supply.
  - Before you remove the covers, completely isolate the device controller from the power supply.

Caution – risk of burning!

- Risk of burning due to escaping medium.
  - Maintain a sufficient distance from the escaping medium.
  - Wear suitable personal protective equipment (safety gloves and goggles).

Caution – risk of injury!

- Incorrect installation or service work may cause burns and other injuries at the connections when hot water or steam suddenly escape at pressure.
  - Ensure proper disassembly.
  - Ensure that the system is de-pressurised before performing the disassembly.

Proceed as follows:

1. Prior to dismantling, block off all "water"-side connections to the device.
2. Disconnect the system from the power supply and secure it against unintended reactivation.
3. Disconnect the power cable of the device from the power supply.
4. Disconnect and remove all cables from the terminals of the device controller.
5. Undo all hose and pipe connections between the device and the system and remove them completely.
6. Drain all water from the device.
7. If necessary, physically remove the device from the system.

The device is removed.

12 Annex

12.1 Reflex Customer Service

Central customer service

Switchboard: Telephone number: +49 (0)2382 7069 - 0
Customer Service extension: +49 (0)2382 7069 - 9505
Fax: +49 (0)2382 7069 - 523
E-mail: service@reflex.de

12.2 Conformity and standards

<table>
<tr><td colspan="3">Declaration of conformity for electrical installations in the pressure maintaining, make-up or degassing systems</td></tr>
<tr><td>1.</td><td>We hereby confirm that the products meets the essential protection requirements as established in the Council Directive to approximate the laws of the Member States relating to electromagnetic compatibility (2004/108/EC).
The following Standards have been applied to assess the products:</td><td>Deutsches Institut für Normung, European Standard 61326 – 1:2006-10</td></tr>
<tr><td>2.</td><td>We hereby confirm that the control cabinets meet the essential requirements of the Low-voltage Directive (2006/95/EC).
The following Standards have been applied to assess the products:</td><td>Deutsches Institut für Normung, European Standard 61010 – 1:2002-08, Occupational Health and Safety Regulations of the trade associations Para 2</td></tr>
<tr><td colspan="2" rowspan="4">Manufacturer
Reflex Winkelmann GmbH
Gersteinstraße 19
D - 59227 Ahlen - Germany
Telephone: +49 (0)2382 7069-0
Fax: +49 (0)2382 7069-588
E-mail: info@reflex.de</td><td>The manufacturer declares that the pressure equipment (the assembly) complies with the requirements of Directive 97/23/EC.</td></tr>
<tr><td>Norbert Hülsmann</td></tr>
<tr><td>Volker Mauel</td></tr>
<tr><td>Members of the Board of Directors</td></tr>
</table>

12.3 Guarantee

The respective statutory guarantee regulations apply.

12.4 Glossary

System	Heating, climate control or other building services system to which the device is connected.
Hysteresis	Delayed behaviour of an output variable relative to the input variable. (The input signal influences the output signal)
Cavitation	Formation and dissolution of vapour-filled cavities (vapour bubbles) in fluids.
Cumulated	Cumulation of values.
Klixon	Pressure safety cut-out for the protection of the pump motor.
Permeation	Process in which a substance (permeate) penetrates or migrates through a solid body.

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reflex

Thinking solutions.

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